Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems	)	ET Docket No. 00-258

COMMENTS OF SPRINT NEXTEL CORPORATION

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Summary

Sprint Nextel offers high-speed, wireless broadband service to fourteen geographic areas with a population of more than 33 million people. Using spectrum in the 2150-2162 MHz band, Sprint Nextel offers a fast, affordable, and highly reliable broadband service that can serve consumers located almost anywhere within sight of centralized tower locations, including rural, remote, tribal and underserved areas located too far from urban areas to receive cable or DSL service. Nearly twenty thousand households, many of them located in underserved areas without access to cable or DSL, currently subscribe to Sprint Broadband Direct.

To make room for Advanced Wireless Services (AWS), the Commission has directed Sprint Nextel and other operators that rely on Broadband Radio Service (BRS) spectrum in the 2150-1262 MHz band to relocate to the 2496-2502 MHz and 2618-2624 MHz bands. Because BRS and AWS cannot coexist in the same or nearby bands, BRS stations must relocate to new spectrum before AWS operations can commence. Therefore, the only real questions in this proceeding are precisely when, where, and how new entrants will relocate the existing BRS operations.

The *Relocation Notice* gives all the wrong answers to these questions. The Commission proposes to treat individual wireless transmissions from individual consumers' homes and businesses as if they were separately licensed, stand-alone, fixed microwave links. The Commission also offers a limited window for relocation and assumes that other point-to-point facilities can substitute for the dense mesh of wireless coverage that BRS currently provides. By treating BRS systems as simple, point-to-point facilities, the link-by-link approach proposed in the *Relocation Notice*

threatens to escalate costs for new entrants, stymie broadband competition, and – worst of all – roll back the availability of broadband service to millions of Americans, particularly those in rural, remote and tribal areas without access to other advanced broadband alternatives.

BRS systems are not point-to-point links. BRS systems are integrated, point-to-multipoint wireless networks that are being moved to new spectrum where they will directly compete with the newly deployed services that occupy the incumbents' old spectrum. Rather than require an intrusive, piecemeal relocation process under a link-by-link methodology, new entrants to the 2150-2162 MHz band should move existing systems as a unit once new spectrum becomes available.

A system-by-system approach to BRS relocation represents the simplest, most equitable, and most cost-effective approach to relocating BRS 1-2 operations out of the 2150-2162 MHz band. BRS receive station hubs are vulnerable to interference within their line of sight. BRS receive station hubs rely on shared logistical, marketing and sales activities within their line of sight. And BRS receive station hubs require access to new consumers within their line of sight to maintain the business fundamentals of the service. Because virtually everything about first-generation BRS operations hinges on line-of-sight coverage from the BRS receive station, the Commission should require AWS new entrants that want to deploy within line of sight of a BRS receive station hub to relocate the BRS system and its line-of-sight customers as an integrated system.

Once relocated under a system-by-system approach using the "relocation zone" approached described here, BRS licensees should receive comparable facilities that

provide the same coverage, throughput, and reliability across the same geographic area as their current systems. Comparable facilities capable of serving the same geographic area will require alternative spectrum – not cable, not fiber, and not DSL. As a result, BRS licensees must complete the process of transitioning to the new 2.5 GHz band plan before they are required to discontinue BRS 1-2 operations in the 2150-2162 MHz band. In addition, AWS new entrants will need to reimburse BRS licensees for equipment capable of operating in the 2.5 GHz band because none of the existing equipment used in the 2150-2162 MHz band can be salvaged. Moreover, where a BRS operator leases spectrum from the BRS license holder, the facility owner – not his lessor – must receive just compensation for the facilities rendered useless by the Commission's relocation decision. Finally, the BRS relocation obligation and the AWS new entrants' initial license terms should expire on the same date to avoid establishing incentives for AWS licensees to delay deploying broadband services to the public in order to avoid having to pay to relocate the BRS incumbents.

Adopting a relocation zone methodology for BRS relocation establishes a fast, efficient, and cost-effective means of moving existing BRS operations to new spectrum. Most importantly, requiring AWS licensees to provide comparable facilities to the dislocated BRS licensees will ensure that 33 million American consumers in rural, suburban, tribal, and urban areas continue to have uninterrupted access to wireless broadband services provided over BRS spectrum.

Table of Contents

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COMMENTS OF SPRINT NEXTEL CORPORATION

I. INTRODUCTION

Sprint Nextel Corporation offers wireless broadband services in fourteen areas with more than 33 million consumers using Broadband Radio Service (BRS) spectrum in the 2150-2162 MHz band.[1] Using spectrum in the 2150-2162 MHz band, Sprint Nextel offers a fast, affordable, and highly reliable broadband service that can serve consumers located almost anywhere within sight of centralized tower locations, including rural, remote, tribal and underserved areas located too far from urban areas to receive cable or DSL service. All told, nearly 20,000 households receive Sprint Broadband Direct.

In a separate proceeding, the Commission directed Sprint Nextel and other operators that rely on Broadband Radio Service (BRS) spectrum in the 2150-1262

[1] Sprint Nextel reflects the merger of Sprint Corporation and Nextel Communications, Inc. Unless context indicates otherwise, all references to the companies' separate pre-merger activities refer to Sprint Nextel.

MHz band to relocate to the 2496-2502 MHz and 2618-2624 MHz bands. Because BRS and new Advanced Wireless Services (AWS) operations that will occupy the 2150-2162 MHz band cannot coexist in the same or nearby spectrum, BRS stations must be relocated to new spectrum before AWS operations can commence.

To protect the delivery of wireless broadband service to the public, including Americans in rural, remote, tribal, and underserved areas, Sprint Nextel urges the Commission to adopt a comprehensive, system-by-system relocation process for all operational BRS facilities in the 2150-2162 MHz band.[2] Adopting a comprehensive transition plan for the BRS facilities in the band will preserve continued access to wireless broadband services for millions of consumers, accelerate the deployment of new, innovative wireless broadband services to millions more, and – by reducing relocation expenses that new entrants must pay – increase the amount of revenue the Federal government can collect in the upcoming Advanced Wireless Services (AWS) auction.[3]

II. DISCUSSION

In the *Relocation Notice*, the Commission seeks comment on a proposal to relocate existing broadband services out of the 2150-2162 MHz band to make room for

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[2] *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems*, Eighth Report and Order, Fifth Notice of Proposed Rule Making and Order, 20 FCC Rcd. 15866 (rel. Sept. 29, 2005)(*Relocation Notice*).

[3] The AWS band occupies paired spectrum in the 1710-1755 and 2110-2155 MHz bands; however, the BRS 1-2 incumbents' licensed spectrum extends to 2162 MHz. While the spectrum above 2155 MHz has not yet been allocated or licensed, AWS licensees should be free to seek reimbursement for relocation expenses from new entrants that occupy the 2155-2162 MHz band once the spectrum above 2155 MHz is licensed.

AWS.[4] In essence, the Commission proposes a mandatory negotiation period between incumbent broadband radio service licensees and the new entrants in the band. The process would last three years during which these parties can reach private agreements that provide the incumbent licensee with comparable facilities somewhere else. If an agreement proves impossible, the new entrants could involuntarily relocate the incumbent, provided that the new entrants pays for the expenses of relocating the incumbent to a new location.[5]

While Sprint Nextel supports the general framework the Commission proposes as a reasonable attempt to allow for new uses by balancing the equities between incumbents and new entrants, many specific elements of the proposal must change to account for the unique qualities of point-to-multipoint broadband wireless systems. The stakes of this proceeding are high. Done properly, the relocation of Broadband Radio Service from the 2150-2162 MHz band to new spectrum promises to promote competition and accelerate the deployment of new service to the public. Done improperly, the relocation threatens to escalate costs for new entrants, stymie broadband competition, and – worst of all – roll back the availability of broadband service to millions of Americans.

A. Roughly 33 Million Americans – Many of Them in Rural or Underserved Areas with No Other Access to Advanced Broadband – Stand to Lose Access to Sprint Nextel's Broadband Services Under the Commission's Draft Proposal.

Sprint Nextel offers its Sprint Broadband Direct service to fourteen geographic

[4] *Relocation Notice,* 20 FCC Rcd. at ¶ 11.

[5] *Id.* at ¶¶ 11-12.

areas with a population of more than 33 million people. The areas receiving service include: Chicago, IL; Detroit, MI; Denver, CO; Phoenix, AZ; Tucson, AZ; Salt Lake City, UT; Oklahoma City, TX; Wichita, KS; Colorado Springs, CO; Fresno, CA; Houston, TX; Melbourne, FL; San Francisco, CA; and San Jose, CA. Sprint Nextel's advanced broadband coverage also extends to numerous tribal areas, including those of:

- the Tohono O'odham Nation;
- the Salt River Pima-Maricopa Community;
- the Gila River Indian Community;
- the AK-Chin Indian Community;
- the Yavapai-Apache Nation; and
- the Pascua Yaqui Tribe.

Sprint Broadband Direct is a wireless, high-speed broadband service that boasts 99.8% reliability over the past two years and service call rates of less than two percent.

First-generation BRS broadband systems are essentially hub-and-spoke systems that support two-way communications. To deliver wireless BRS broadband services to consumers, Sprint Nextel uses portions of the 2500-2690 MHz band for downstream traffic from a centralized transmitter to consumers' homes and business and uses the 2150-2162 MHz band for upstream traffic from the thousands of small external antennas on consumers' homes back to the central receiver. In the 2500-2690 MHz band, transmissions radiate from a centralized hub out to end points along spokes of different path lengths. In the 2150-2162 MHz band relevant to this proceeding, low-power transmissions radiate from the end points of the spokes back

to the centralized hub.[6] The resulting integrated wireless broadband service offers families and small businesses a rich, highly reliable broadband experience with downstream bursts of up to 5 Mbps and upstream speeds of 256 Kbps.

Wireless broadband over BRS is an important alternative to DSL and cable. DSL is limited to areas within approximately three miles from the telephone company's central office switching center, and cable modem service often does not reach homes in rural areas or small businesses in suburban office parks. As a completely wireless solution, however, Sprint Broadband Direct offers service to consumers located almost anywhere within sight of the centralized tower location, including remote, rural, and underserved tribal areas located too far from urban areas to receive cable or DSL.[7]

Comparing Sprint Nextel's BRS customer base against existing cable franchises in the geographic areas that Sprint Nextel serves helps demonstrate the extent of consumer reliance on wireless BRS broadband service. In Wichita, Kansas,

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[6] While the two-way broadband systems that use the 2150-2162 MHz band are categorized as point-to-multipoint systems, the term is something of a misnomer. In the 2150-2162 MHz band, these systems behave as "multipoint-to-single point" systems because radiofrequency transmissions travel upstream from each customer's home or business to a single, centralized response station hub facility.

[7] Although BRS licensees use the 2150-2162 MHz band primarily to deliver wireless broadband services to homes and businesses, the stop-and-start nature of regulatory reform in the BRS-EBS band has left the spectrum balkanized with other types of service offerings. As the Commission notes, these other services include: downstream analog video; downstream digital video; and downstream digital data. *See Relocation Notice*, 20 FCC Rcd. at ¶ 13. For its part, Sprint Nextel continues to operate a handful of legacy one-way video systems in certain areas. As discussed in greater detail below, the same basic "relocation zone" method can apply to point-to-multipoint systems regardless of whether they are delivering two-way broadband or video services. *See* discussion, *infra,* § II(B)(3). For a list of two-way broadband relocation zones, *see* Appendix A. For a list of Sprint Nextel's legacy one-way video operations and the proposed relocation zones for those areas, *see* Appendix B.

for instance, more than 41% of Sprint Nextel's wireless broadband customers are located outside of cable franchise areas. In Oklahoma City, Oklahoma, the number is 43%. And in Salt Lake City, Utah, more than 37% of all Sprint Nextel customers are located outside of cable franchise areas. Significantly, these figures likely *understate* the number of BRS broadband subscribers that have access to no other advanced broadband alternative because not all cable companies have constructed cable plant across their entire cable franchise area and not all have upgraded network facilities to support broadband communications. [8]

Forcing Sprint Nextel to discontinue its BRS broadband service offering before new spectrum becomes available or prohibiting Sprint Nextel and other BRS licensees from adding new customers to existing BRS service areas would have a material adverse affect on the national availability of broadband in the United States. Under section 706 of the Communications Act, the Commission conducts regular inquiries concerning the availability of advanced telecommunications capabilities.[9]

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[8] The Commission distinguishes between "high-speed" and "advanced services" lines. A high-speed line is a connection to an end-user customer that is faster than 200 kbps in at least one direction. Advanced services lines are connections to end-user customers that are faster than 200 kbps in both directions. BRS offering qualifies as an "advanced services line" because their transmissions exceed 200 kbps in both directions. *See Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, Notice of Inquiry, Docket 04-54, 19 FCC Rcd. 5136, Appendix A: High-Speed Services for Internet Access (March 17, 2004). The adverse effect of prematurely shutting off BRS would have an even larger adverse affect on the subset of "high speed" lines that qualify as "advanced services." While satellite services can offer wireless connectivity to the Internet, these services are generally asymmetrical and would likely not qualify as "advanced." A potential broadband satellite subscriber must also have a clear view of the southern sky and be capable of tolerating lag between the terrestrial user terminals and the orbiting satellite system.

[9] 47 U.S.C.A. § 706.

Since 1996, the Commission has reported a steady increase in the availability of broadband services nationally. The percentage of zip codes with four or more high-speed broadband providers has steadily increased from 27.5% to 46.3%.[10] Similarly, the percentage of zip codes with no high-speed broadband providers has consistently decreased from 22.2% in 2001 to 6.8% in 2003.[11] While precise estimates are difficult to project, the elimination of BRS wireless broadband as an option for the public – either through shutting off service before replacement spectrum becomes available or through prohibiting new customer additions in existing markets – has the potential to undercut these positive trends in broadband deployment. Sprint Nextel uses BRS 1-2 spectrum to offer advanced wireless broadband service to *more than 4,000 zip codes.* If BRS operations were prematurely discontinued or prevented from adding customers, the nation could see the first ever *decrease* in the number of the zip codes with four or more high-speed offerings and, depending on the availability and performance of asymmetrical satellite services, an *increase* in the number of zip codes with no advanced broadband provider whatsoever.

Under the proposals advanced in the *Relocation Notice*, the risk of inadvertent or premature shut down of Sprint Nextel's existing wireless broadband network is real. Consistent with applicable rules for BRS, Sprint Nextel located BRS base station receivers high above ground to provide line-of-sight reception for weak signals coming from CPE located in any point within a large swath of territory surrounding

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[10] *Availability of Advanced Telecommunications Capability in the United States*, Fourth Report to Congress, FCC 04-208, 19 FCC Rcd. 20540 (2004) (*Fourth Section 706 Report*).

[11] *Id.*

the central hub. The AWS new entrants, however, will use the 2.1 GHz band for relatively powerful AWS base station transmitters. As explained in detail below, the centralized BRS receive hub stations are so sensitive that the placement of almost any number of co-channel, adjacent, or non-contiguous AWS base stations within line-of-sight of the BRS base station receiver will cause harmful interference to the centralized BRS receiver and disable all BRS operations in the market.[12] Because BRS and AWS operations cannot coexist in the same or nearby bands, BRS stations must be relocated to new spectrum before AWS operations can commence. The only real questions in this proceeding are precisely when, where, and how new entrants will relocate the existing BRS operations.

B. Relocating Integrated Point-to-Multipoint Systems Terminating at Individual Homes and Businesses Represents a Fundamentally Different Task from Moving Discrete, Point-to-Point Links.

The Commission must confront how to move the tightly integrated, point-to-multipoint operations of one class of wireless broadband service providers to allow for the development of another, competing class of broadband services. The Commission has repeatedly authorized the relocation of fixed, point-to-point microwave communications links.[13] These fixed links were essentially "dumb pipes" that moved

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[12] *See infra* at § II(B)(1) and *Appendix D: Engineering Statement*. Due to sensitivity of the centralized BRS receive station hub to out of band emissions, transmissions from AWS base stations need not be co-channel with the BRS receive station frequencies to produce system-disabling interference to BRS operations in the 2150-2162 MHz band. *Id.* Moreover, the vulnerability of the BRS hub stations to interference from AWS base stations is entirely independent of the particular air interface that an AWS carrier might use. Instead, the BRS hub stations' vulnerability is a function of noise, co-channel transmissions, and the signal strength entering the receiver.

[13] *See Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, ET Docket No. 92-9, First Report and Order and Third (continued….)

communications traffic from point A to point B. The links were so rudimentary that nothing about the service required the use of any particular spectrum band or, indeed, any wireless resource at all. Moreover, the point-to-point services slated for relocation did not compete directly or indirectly with the new, point-to-multipoint services envisioned for the band, such as PCS and MSS.[14] In its *Emerging Technologies* line of decisions, therefore, the Commission concluded that various new entrants to different spectrum bands could replace existing point-to-point microwave links with any "comparable facility" offering the same throughput, reliability, and operating cost as the original facility.[15] For fixed, point-to-point microwave links, the Commission held that any "comparable facilities" policy would suffice to protect incumbent licensees from harmful interference, prevent disruption of the existing services, and ensure incumbents were "no worse off" as a result of the relocation.[16] As

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Notice of Proposed Rule Making, 7 FCC Rcd. 6886 (1992); Second Report and Order, 8 FCC Rcd. 6495 (1993); Third Report and Order and Memorandum Opinion and Order, 8 FCC Rcd. 6589 (1993); Memorandum Opinion and Order, 9 FCC Rcd. 1943 (1994); Second Memorandum Opinion and Order, 9 FCC Rcd. 7797 (1994); *aff'd Association of Public Safety Communications Officials-International, Inc. v. FCC*, 76 F.3d 395 (D.C. Cir. 1996); *see also Teledesic, LLC v. FCC*, 275 F.3d 75 (D.C. Cir. 2001); *Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, WT Docket No. 95-157, First Report and Order and Further Notice of Proposed Rule Making, 11 FCC Rcd 8825 (1996); Second Report and Order, 12 FCC Rcd 2705 (1997); Memorandum Opinion and Order on Reconsideration, 15 FCC Rcd 13999 (2000).

[14] *See, e.g., Teledesic*, 275 F.3d at 79 (describing the dislocated fixed service licensees as serving various point-to-point functions, such as remote monitoring of gas and petroleum pipelines and public utility functions, while satellite new entrant would offer "a large number of earth stations to support a global Internet telecommunications network" that would offer "global Internet access, two-way digital communications, video conferencing, telemedicine, and residential voice and data communications services").

[15] 47 C.F.R. § 101.89(d) (defining comparable facilities for fixed links as having the same throughput, reliability, and operating costs).

[16] *Emerging Technologies Second Memorandum Opinion and Order*, 8 FCC Rcd. at ¶ 25.

a practical matter, many new entrants under the point-to-point relocation policies chose to relocate entire chains of point-to-point links to avoid complicated, multi-stage interference analyses and system relocations. At least conceptually, however, analyzing each link as a separate unit made a certain amount of sense because – in essence – each link *was* a separate unit.

Certain basic lessons of the point-to-point relocation decisions should no doubt apply to the relocation of point-to-multipoint BRS operations from the 2150-2162 MHz band. First, the relocation process should "prevent disruption to existing services and . . . minimize the economic impact on licensees of those services."[17] Second, any relocation process must "take into account the unique circumstances faced by the various incumbent operations."[18] Third, "incumbents must be provided with replacement facilities that allow them to maintain the same service in terms of: (1) throughput – the amount of information transferred within the system in a given amount of time; (2) reliability – the degree to which information is transferred accurately and dependably within the system; and (3) operating costs – the cost to operate and maintain the system."[19] While the basic goals of the point-to-point relocation proceedings should apply with equal force to point-to-multipoint networks, BRS systems are, as the Commission acknowledges, "*significantly different*" from all

[17] *Relocation Notice*, 20 FCC Rcd. at ¶ 16; *see Emerging Technologies First Report and Order*, 7 FCC Rcd. 6886 at ¶ 1 (adopting policies intended "to prevent disruption of existing 2 GHz services and minimize the economic impact on the licensees of those services").

[18] *Relocation Notice*, 20 FCC Rcd. at ¶ 13.

[19] *Id.* at ¶ 16.

of the fixed, point-to-point links that the Commission has previously relocated.[20]

Point-to-multipoint BRS systems differ from simple, point-to-point microwave links in at least four ways. First, unlike the original fixed, point-to-point link relocations, BRS licensees are *geographic service area* licensees.[21] BRS 1-2 licensees are not constrained to the single path between two points, but possess a right to operate anywhere within their authorized service area. Second, BRS 1-2 licensees do not have stand-alone transmission paths located on their property, but rather originate transmissions from the most competitively sensitive points of their network: the homes and businesses of the incumbents' customer base. Third, both the BRS incumbent licensees and the new entrants intend to compete for the same broadband subscribers. The relocation process, therefore, creates an opportunity for new entrants to game the process for competitive advantage. Fourth, whereas the fixed service licensees had multiple spectrum bands available in which to continue operations, the limited replacement spectrum set aside for BRS licensees itself requires reconfiguration before it is available.

In the past, the Commission has recognized the differences between point-to-point links and point-to-multipoint systems and has adopted different policies for each class of licensee. In the *Upper 200 Specialized Mobile Radio Order*, for instance, the Commission assured point-to-multipoint licensees received

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[20] *Id.* at ¶ 52 (emphasis added).

[21] *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 14165, ¶ 54 (2004) (*BRS-EBS Order*) ("We conclude that all BRS and EBS licensees will be licensed on a geographic area basis.").

"comparable *systems*" with the same capacity, quality of service, and operating costs viewed from the perspective of the end user.[22] Recognizing the geographic coverage areas of the incumbent licensees, the Commission expressly rejected proposals to define the term "system" narrowly. Instead, the Commission found that new entrants must offer "equivalent channel capacity" for the incumbents' overall systems, which the Commission held should include the centralized base station transmitter and all units capable of operating with that base station.[23] "A narrower definition," the Commission held, would "would impair the flexibility of incumbents to continue meeting their customer's needs."[24] Similarly in the *800 MHz Order*, the Commission determined that the point-to-multipoint public safety and private wireless incumbents in the 800 MHz band should receive: (i) equivalent channel capacity; (ii) equivalent signaling capability, baud rate and access time; (iii) coextensive geographic coverage; and (iv) equivalent operating costs.[25] Thus, while the same general process and principles of fairness apply to point-to-point and point-to-multipoint licensees, the Commission has adopted different relocation

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[22] *See Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band,* Second Report and Order, 12 FCC Rcd. 19079 (1997) (*Upper 200 Specialized Mobile Radio Order*) (emphasis added).

[23] *Id.* at ¶ 91.

[24] *Id.*

[25] *Improving Public Safety Communications in the 800 MHz Band*, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd. 14969, ¶ 202 (2004) (*800 MHz Order*); *see also, e.g., Amendment of the Commission's Rules to Relocate the Digital Electronic Message Service ("DEMS") from the 18 GHz Band to the 24 GHz Band and to Allocate the 24 GHz Band for Fixed Service,* Order, 12 FCC Rcd. 3471, ¶ 14 (1997), *recon. denied*, 13 FCC Rcd. 15147 (1998) (adopting rules for point-to-multipoint systems to ensure equivalent capacity and reliability of service and allowing for four times as much spectrum to account for diminished propagation characteristics).

policies for point-to-multipoint systems to account for the inherent differences between these systems and point-to-point links.

In the case of BRS, however, the Commission's *Relocation Notice* ignores the point-to-multipoint relocation decisions and proposes to evaluate each BRS connection running from the service provider to the centralized BRS receive station as if it were a simple, fixed point-to-point microwave link. First, the Commission proposes to develop an interference threshold that would trigger relocation of the BRS "links." Second, the Commission proposes to permit any comparable facilities, including non-spectrum-based solutions, such as cable, fiber, or DSL, to substitute for dislocated 2.1 GHz BRS "links." Third, the Commission proposes to exclude any new "links" from the reimbursement scheme. Each element of this link-by-link approach is fundamentally flawed when applied to point-to-multipoint BRS systems and must be modified.

1. Unlike Point-to-Point Links, When One "Link" in a Point-to-Multipoint BRS System Experiences Interference, the Entire BRS System is Disabled.

Sharing between the type of upstream BRS transmissions that Sprint Nextel and other BRS licensees operate in the 2150-2162 MHz band and the downstream transmissions that future advanced wireless services (AWS) licensees plan to implement is impossible. The high-elevation centralized BRS receive station hub is designed to be extraordinarily sensitive to radiofrequency emissions because the CPE transmissions that it must detect are weak and are located at distances of up to 35 miles away from centralized receiver hub. The centralized BRS receive station hubs will experience harmful interference from operations in AWS Blocks A-F as well as from similar, future operations in the 2155-2180 MHz band.[26]

In each of the fourteen geographic areas where Sprint Nextel provides broadband service today, Sprint Nextel has located the single response station hub at a high elevation site, usually located on or near a mountaintop, skyscraper, or a tower site of sufficient elevation to support unobstructed line of sight transmissions from distant subscriber transmitters. To avoid additional signal-to-noise degradation that would be caused by any waveguide or feed line losses, moreover, the centralized receive station hub incorporates Low Noise Amplifiers on the hub tower that are connected directly to high-gain (19 dBi) receive antennas. In addition, the BRS receive station hubs can only support low orders of modulation, such as quadrature phase-shift keying (QPSK) modulation, which requires use of

[26] *See Appendix D, Engineering Statement of Robert Gehman, Jr. P.E.* at 2-6 (Nov. 21, 2005) (*Appendix D: Engineering Statement*).

the entire six megahertz channel. Unlike classic point-to-point systems that are fixed, highly directional, sometimes capable of compression, and designed with sufficient fade margin to prevent interference from nearby signals, the centralized receive hubs in Sprint Nextel's first-generation wireless broadband offering are wide-area receiving facilities with extremely limited link budgets that are, by necessity, extraordinarily vulnerable to co-channel and adjacent-channel interference.[27]

Meanwhile, the base stations that AWS operators intend to locate in the 2150-2162 MHz band are far more powerful than the comparatively weak signals emitting from CPE at subscribers' homes and businesses. AWS base stations are currently authorized to transmit with signal strengths of up to 1640 Watts EIRP per transmitter and the Commission has sought comment on increasing these limits to 6560 watts EIRP and 13,120 watts EIRP in rural areas over more than three megahertz bandwidth.[28] Even under the existing power limits for AWS base stations, the effects of so much power coming from co- or adjacent-channel stations into a sensitive wide-area receiver would disable service to any BRS operations

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[27] *See id.* at 2.

[28] *Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 20 FCC Rcd. 13900, ¶63 (2005) (*Wireless Streamlining Notice*). Certain proposed standards would permit transmit power to greatly exceed even these extraordinary levels. *Id.* at ¶ 60 (noting that "power levels permitted under [one industry] proposal could easily reach some very large numbers (i.e. 32,800 Watts in a rural area) for wider emission types such as Wideband Code Division Multiple Access (W-CDMA) using 5 MHz bandwidths").

within line of sight of an AWS base station transmitter.[29]

The centralized base station receivers in a BRS system are so sensitive that the introduction of even one co-channel AWS base station transmitter within line of sight of a BRS base station receiver will shut down the entire system for that geographic area. Assume, for instance, that an AWS base station operated with an exceptionally low transmit power of 100 miliwatts (or 20 dBm) with an antenna gain of 17 dBi across a 5 MHz bandwidth. For simplicity, assume a BRS receive station hubs operate with an antenna gain of 19 dBi across a 5 MHz bandwidth with a noise floor of –107 dBm and a system noise figure of 4 dB. This level of performance would require the new entrant to protect the BRS receive station to a noise floor of –109 dBm (-107 dBm +4 dB -6) to guard against a 1 dB degradation in performance. Using a free space loss formula,[30] the AWS base station would need to be located *more than 1000 miles* away from the centralized BRS receive station hub to prevent harmful interference if line of sight could exist at those extreme distances.[31] In other words, *limiting the effective isotropic radiated power (EIRP) of AWS base station will not solve the problem because comparatively powerful AWS*

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[29] These results hold true for AWS base stations in all AWS channel blocks. The mechanics of the interference from AWS base stations in non-adjacent AWS channel blocks are the same as for the co-channel interference described here. AWS base stations in the AWS Blocks A-E will cause harmful interference to highly sensitive BRS 1-2 receive station hubs, which are extremely sensitive to any excess radio frequency emissions above a noise floor of –109 dBm. *See Appendix D: Engineering Statement* at 2-6.

[30] Free space loss is defined by 36.6 + 20 Log (d) + 20 Log (f) where (d) = distance in miles and (f) = frequency of 2150 MHz.

[31] *See Appendix D: Engineering Statement* at 2 (demonstrating that an AWS base station with 100 milliwatts of power would need to be located 1,259 miles away from a centralized (continued….)

base stations will disable the hub station almost anytime they are within line of sight of the centralized receive station hub.[32] Therefore, any AWS base station within line of sight of a centralized BRS 1-2 receive hub station must relocate that system to prevent harmful interference to the incumbent licensee.

As the Commission suggests, AWS mobile handsets will also experience interference from fixed BRS end user transmitters under certain conditions. Existing BRS 1-2 end user transmitters generate permissible noise as defined by an emissions mask of 43+10 log (P) across a one megahertz bandwidth, which equals -13 dBm/MHz, or – stated as the input to the external mounted BRS 1-2 transmitter with a typical 17 dBi 24 degree beamwidth antenna – a measurement of -6 dBm/5 MHz.[33] Assuming the AWS handset has a typical 0 dBi antenna and a 4 dB noise figure, an AWS handset would require 120 dB attenuation to maintain a communications link with the associated AWS base station. To prevent a one

(Continued from previous page)
BRS receive station hub to prevent harmful co-channel interference if line of sight were possible).

[32] While AWS base stations could theoretically deploy highly directional antennas pointed away from the BRS base station hub receiver combined with shielding on the back lobe of the AWS base station antenna to attenuate the emissions directed toward the highly sensitive BRS base station receiver, AWS licensees could likely not economically provide coverage to the entire geographic area served by the BRS licensee, particularly the core urbanized areas where most BRS receive station hubs are located and which AWS licensees will most want to serve. The complications of this process for tower siting, network planning, and construction would prove enormous and, in any case, would prove irrelevant once licensees of BRS 1-2 vacate the band. At that point, the AWS new entrants that had just engineered around the vulnerable BRS receivers or deployed their networks in piecemeal fashion away from the urban core where most BRS centralized receive station hubs are located would need to rethink their entire network deployment strategy and reconfigure existing towers and transmitter parameters to provide coverage and eliminate redundancies implemented to protect the sensitive BRS base station receivers.

[33] Feed-line losses are not considered.

decibel increase in the noise floor would require a separation distance of approximately seven miles between a fixed BRS 1-2 end user transmitter and an AWS mobile receiver.[34] Whenever BRS end user transmitters and AWS receivers approached within one mile of one another under line-of-sight conditions, the AWS mobile receiver will likely lose its connection to the AWS base station.

Whether through harm to the operations of the centralized BRS base station receiver or the AWS end user handset, the proximate operation of wireless BRS broadband and AWS broadband in the same geographic area will generate harmful interference. When it comes to the geographic area relevant to triggering BRS relocation, however, the two interference scenarios are orders of magnitude apart. Whereas high-site, high-sensitivity BRS receive station hubs are theoretically vulnerable to interference for more than 1000 miles, BRS CPE transmitters, which are usually mounted no higher than 30 to 50 feet above ground level, pose a much more geographically confined threat. Therefore, the primary focus of any interference analysis should rest on the vulnerable centralized BRS receive station hub because it will suffer harmful interference from AWS base stations long before low-power BRS CPE causes harmful interference to AWS mobile handsets.

Yet rather than focus on the near-certain and catastrophic interference that the vulnerable BRS receive station hubs will experience in the face of AWS base station transmissions even at great distances, the Commission focuses on the harm that BRS end user transmitters affixed to the exteriors of homes and businesses

[34] *See Appendix D: Engineering Statement* at 4. At a separation distance of one mile under line-of-sight conditions, the AWS handset would likely experience a noise floor (continued….)

could potentially do to future AWS mobile handsets.[35] By focusing on the harm to AWS from comparatively weak BRS CPE, the *Relocation Notice* ignores the much more likely and geographically dispersed problem of co-channel, adjacent-channel, and non-contiguous AWS base station interference to the centralized BRS receive station hubs.

In short, the Commission's proposal flips the solution on its head. Rather than respond to the more geographically expansive interference problem, the Commission focuses on thousands of geographically narrow interference problems and tries to aggregate them into a cohesive relocation plan.[36] The Commission tacitly acknowledges the problem when it notes that "[i]n some instances relocation of BRS operations on a link-by-link basis may be infeasible . . .[and] it may be necessary for the AWS licensee to relocate more BRS facilities than an interference analysis conducted on a link-by-link basis might indicate as technically necessary."[37] An AWS-centered, link-specific approach, in other words, ignores the reality that BRS receive station hubs, which were designed to observe weak BRS CPE, will suffer interference from comparatively powerful AWS base stations long before BRS CPE harms AWS CPE.[38]

(Continued from previous page)
increase of more than 10 dB. *Id.*

[35] *Relocation Notice,* 20 FCC Rcd. at ¶ 15.

[36] *Id.*

[37] *Id.*

[38] Sprint Nextel and other BRS licensees designed the centralized BRS receive station hubs to meet Commission requirements that permitted the deployment of two-way wireless broadband operations in the BRS-EBS spectrum. The Commission limited emissions from subscriber premises to the centralized BRS receive station hubs, which, in (continued….)

The Commission, however, proposes to require the AWS new entrants to relocate the individual links connections between the BRS incumbent receive stations and their subscribers' homes and businesses as needed to prevent interference to AWS.[39] Evaluating every link between the service provider and the consumer for possible interference from AWS operations represents an enormous burden for licensees, but the Commission presses ahead with the link-by-link methodology, seeking comment on whether it might be possible to establish certain categories of links that might be more likely to experience interference than others.[40]

The short answer, of course, is no. Even if it were technically warranted or effective in preventing interference, the link-by-link analysis proposed in this proceeding would require hairsplitting, case-by-case evaluation for every connection between the consumer and the centralized BRS receive station hub. Application of section 24.237 to the BRS relocation process or use of a table similar to TIA Telecommunications Systems Bulletin (TSB) 10-F are impractical since both would

(Continued from previous page)
turn, required the centralized BRS receive station hubs to remain open to comparatively weak signals emanating from remotely located CPE. This hub-and-spoke architecture allowed for the deployment of wireless infrastructure to serve distant areas, including those in rural and remote locations that might not otherwise have had access to broadband service.

[39] *Id.*

[40] The Commission asks whether it might apply something similar to Section 24.237 of its rules in which PCS licensees must perform link-specific engineering analyses to ensure that their proposed operations do not cause interference to incumbent fixed microwave services. *Id.* at ¶ 28. The Commission also seeks comment on whether the use of a table similar to TIA Telecommunications Systems Bulletin (TSB) 10-F might allows AWS new entrants to categorize thousands of BRS "links" into larger, homogenous groups that could be treated similarly.

require the AWS licensees to serve a prior coordination notice on the BRS licensee for communications paths from an individual home or business back to the receive station hub. No amount of categorization of individual BRS links will help solve the fundamental error of applying a point-to-point relocation methodology. Whereas a fixed service licensee need only monitor one link, a point-to-multipoint BRS licensees would need to monitor a near infinite number of potential links within its geographic service area. Any one error in the link-by-link analysis could lead to a system-wide outage of all of the links in the point-to-multipoint BRS system through the introduction of harmful receiver overload or out of band emissions interference into the single, centralized receive station hub. More importantly, neither proposed method would actually prevent interference.

The link-by-link relocation process that the Commission proposes would impose a series of grievously burdensome regulatory obligations on incumbents and new entrants alike, but would fail to protect either party against the harmful interference that their mutually incompatible systems will cause. Luckily, the entire ineffective and unwieldy process is unnecessary because a relocation zone methodology provides a simpler, cheaper, and more effective approach.

2. Unlike Point-to-Point Links, BRS Systems Must Overcome Routine Customer Churn by Continuing to Add New Customers Within Their Existing Markets.

BRS licensees cannot operate an ongoing commercial business if they cannot add new customers to the geographic areas where centralized receive station hubs are already deployed. The Commission, however, proposes that all "major modifications and extensions to existing BRS systems will be authorized on a

secondary basis to [new] systems in the 2150-2160 MHz band after the effective date of the Report and Order in this proceeding."[41] Indeed, the Commission's *Relocation Notice* proposes to relegate any new or modified point-to-multipoint BRS facilities to secondary status unless the incumbent BRS licensee "affirmatively justifies primary status and establishes that the modification would not add to the relocation costs of the emerging technology licensees."[42]

The Commission's proposed cut-off for new BRS deployments follows the logic of its point-to-point relocation decisions from the 1990s. In the context of simple, point-to-point networks a cut-off on new links makes sense for two reasons. First, for existing point-to-point systems, nothing in the decision to make new point-to-links secondary would "devalue the usefulness" of the incumbent licensee's existing point-to-point operations.[43] Second, for new point-to-point fixed microwave facilities in the bands slated for alternative uses, the decision to make point-to-point links secondary to new operations did not unduly constrain operators that wanted to expand their networks, but rather excluded just one of the many facility-based deployments that operators that wanted move information between two points had to chose from. For point-to-point links, the Commission found that the costs of "restrict[ing] use of these bands in the future by new services" outweighed the limited benefits of unfettered carrier choice of how best to move data from one place

[41] *Id.* at ¶ 22.

[42] *Id.* at ¶ 22; *see also Emerging Technologies First Report and Order*, 7 FCC Rcd. at ¶ 30.

[43] *Emerging Technologies First Report and Order,* 7 FCC Rcd. at ¶ 30 ("Existing licensees must be allowed to operate without devaluing the usefulness of their 2 GHz facilities.").

to another.[44]

In the case of BRS receive links in the 2150-2162 MHz band, however, neither rationale for applying secondary status to modified and extended lines applies. Unlike the point-to-point microwave facilities, relegating all new customers to secondary status does, in fact, "devalue the usefulness" of the existing BRS spectrum and facilities. Sprint Nextel invested heavily in constructing, building, and operating centralized BRS hub facilities and the 2150-2162 MHz spectrum in fourteen markets. The net result of these extensive capital, facilities, and labor investments is an addressable market for BRS services of approximately 33 million people. If the Commission were to adopt its point-to-point relocation policy of making all new extension of service secondary, however, the addressable market would essentially vanish overnight, plummeting from 33 million potential customers to no more than the existing base of less than 20,000 customers. Such a precipitous drop in the addressable market represents an unwarranted and unjustifiable devaluation of the usefulness of the facilities used to support BRS operations in the 2150-2162 MHz band – contrary to one of the core goals of the Commission's original relocation decisions.

To be clear, Sprint Nextel does not oppose excluding the construction of new BRS receive station *hub facilities* implemented after the effective date of the Order from the scope of the AWS new entrants' reimbursement obligation. For markets where BRS receive station hubs are already constructed, however, BRS incumbents

[44] *Emerging Technologies Third Report and Order,* 8 FCC Rcd. at ¶ 55.

must be able to add new customers to their networks. If the AWS new entrants want to limit the number of *BRS connections to end users* within markets where BRS receive station hub facilities are already deployed to constrain relocation expenses, the AWS new entrants have an easy solution: they can simply relocate the system in that geographic area to its new, alternative spectrum location in the 2.5 GHz band.

3. Unlike Point-to-Point Links, BRS Systems Must Install Equipment in Consumers Homes and Business, Which Raises Privacy Concerns for Consumers and Competitive Concerns for BRS Licensees.

To protect consumer privacy and prevent competitive harm, BRS licensees or their designees must disassemble and install any BRS customer premises equipment themselves. The Commission's *Relocation Notice* proposes to require the AWS new entrants to "construct, test, and deliver to the incumbent comparable replacement facilities" consistent with the procedures that applied to point-to-point microwave links.[45] The point-to-point relocation decisions specifically direct the new entrant to "build the new . . . system and test it for comparability" with the existing system.[46] Unlike the point-to-point microwave links that the Commission has relocated, however, wireless BRS transmission facilities are not located at remote tower sites, on top of large corporate buildings, or on other facilities under the control of the incumbent BRS licensee. Wireless BRS equipment requires professional installation and disassembly at the customer's home or business.

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[45] *Relocation Notice*, 20 FCC Rcd. at ¶ 25.

[46] *Emerging Technologies First Report and Order,* 7 FCC Rcd. at ¶ 24.

While Sprint Nextel supports requiring the AWS new entrants to pay "all engineering, equipment, site and FCC fees, as well as any reasonable, additional costs that the relocated fixed microwave licensee may incur as a result of operation in a different . . . band,"[47] requiring the AWS new entrants or their designees to physically disassemble or install equipment at a consumer's home or business raises serious privacy concerns for consumers and grave competitive risks to Sprint Nextel's ongoing wireless broadband business.

Consumers are deeply concerned about the privacy of their personal information and unwanted intrusions in their daily lives. When Sprint Nextel installed the original BRS broadband equipment less than five years ago, for example, it recognized the sensitivity that consumer's attached to a home-based installation. Sprint Nextel used the costly truck roll to install BRS CPE as a relationship-building opportunity for the customer. A highly trained technician not only optimized Sprint Broadband Direct service for maximum performance, but also could assist the customer in configuring his home network. To this day, the trained technician remains an important point of contact with the consumer and the technician's visit to the customer represents an opportunity to build – or destroy – customer satisfaction and loyalty.

The Commission should adopt rules similar to those it has used in other relocation proceedings that vest in the dislocated incumbent the choice of selecting the party that performs the actual relocation work. A BRS licensee should be free

[47] *Emerging Technologies First Report and Order,* 7 FCC Rcd. at ¶ 24.

to do the work itself, hire a qualified contractor, or make other similar arrangements. The Commission should not mandate that BRS licensees allow their direct competitors to have access to BRS customers for purposes of implementing the reconfiguration.

C. Adopting a System-by-System – as Opposed to a Link-by-Link – Relocation Process Will Protect Consumers Against Disruptions in Broadband Service, Minimize Administrative Costs, and Accelerate BRS Transition out of the Band.

Evaluating the interference effects on a single, centralized BRS hub station represents a far simpler, far more effective choice than the wasteful, time-consuming and ultimately pointless task of evaluating tens of thousands of links individually. A link-by-link relocation process assumes that each link is a stand-alone unit. In an integrated, point-to-multipoint system, by comparison, each link benefits from *shared* transmission and reception equipment, as well as *shared* logistical, marketing, and sales activities by the licensee. Rather than disaggregate an integrated point-to-multipoint BRS operation into component links to try to fit it into the mold of a classic point-to-point link, the Commission's BRS relocation policies should treat the operations surrounding each centralized BRS hub station for what they are: a single, integrated system that must be relocated as a unit.

1. Drawing a "Relocation Zone" around the Centralized BRS 1-2 Receive Station Offers a Reliable, Simple Means of Triggering AWS New Entrants' Relocation Obligation.

To accommodate the integrated nature of first-generation BRS wireless broadband systems operating in the 2150-2162 MHz band, the Commission should adopt a relocation process that moves integrated point-to-multipoint BRS systems as a unit. Sprint Nextel proposes that the Commission adopt a "relocation zone"

model. Under the relocation zone model, AWS new entrants that wish to operate AWS base stations within line of sight of the centralized BRS receive station hub would need to relocate BRS operations in that geographic area. AWS new entrants could operate freely anywhere outside of the relocation zones. Indeed, assuming 50 foot AWS base stations are deployed, AWS new entrants could operate in more than *98 percent of the nation's land mass* and serve more than *87 percent of the nation's populatio*n without ever having to ever relocate a single Sprint Nextel wireless broadband facility under the relocation zone proposal advanced here.[48] Because only a limited number of centralized BRS receive station hubs are currently operational, the relocation zones in which AWS new entrants would first have to transition BRS systems to available 2.5 GHz spectrum would represent but a fraction of the nation's population and geographic area. A map showing the relocation zones for Sprint Nextel's two-way wireless broadband facilities in the 2150-2162 MHz band appears below.[49]

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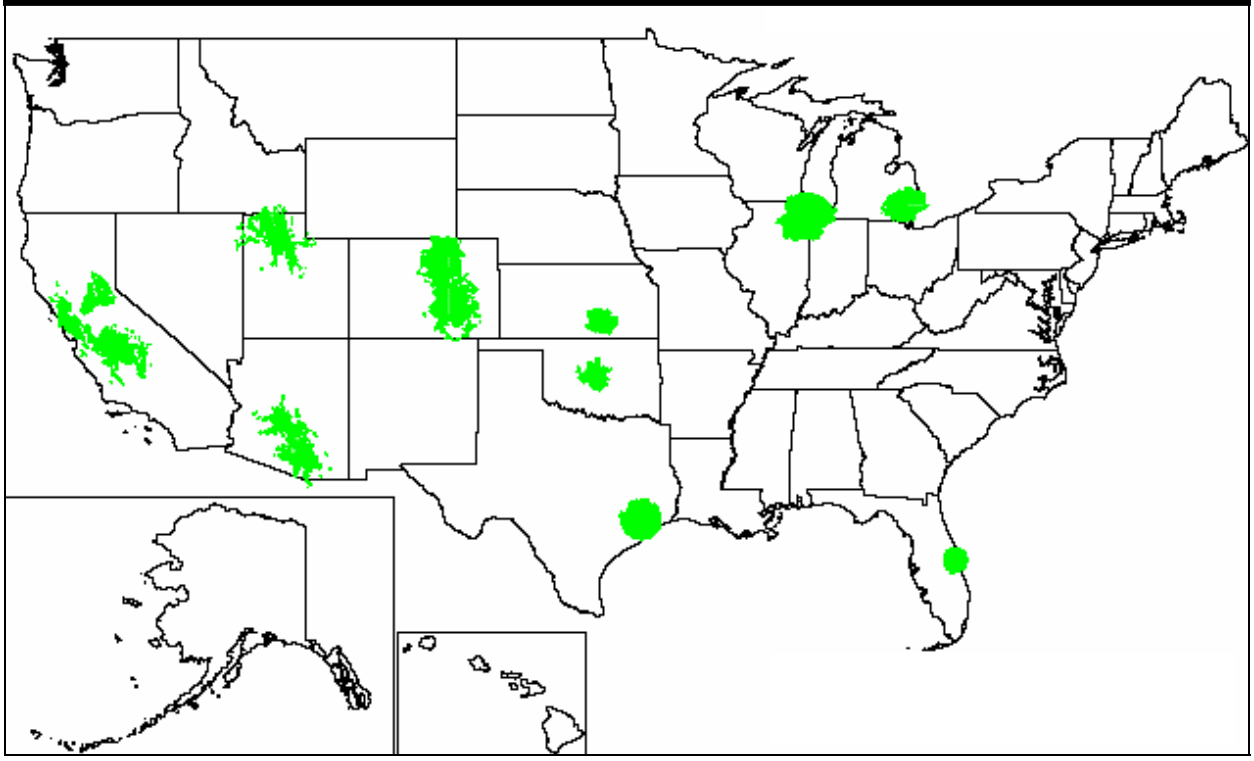
[48] While a handful of other BRS licenses use the 2150-2162 MHz band to provide two-way broadband services today, these other companies' wireless broadband BRS offerings are unlikely to change the basic conclusion that AWS new entrants can serve the vast majority of the nation's territory and population because Sprint Nextel's network is by far the nation's largest wireless broadband network using BRS spectrum.

[49] The map is drawn based on the actual elevation data for Sprint Nextel's centralized BRS base station hubs and takes into account topology, but not morphology. The analysis assumes AWS base station transmitters are no higher than 50 feet above ground level. For detailed studies of each centralized BRS base station location and how these relocation zones would change with AWS base station transmitters at different heights above ground level, *see infra* Appendix A.

Relocation Zones for Sprint Nextel Broadband Facilities in the 2150-2162 MHz Band



The Commission has adopted an approach similar to the relocation zone proposal in other contexts. In its *3650 MHz Order,* for instance, the Commission adopted circular "protection zones" of 150 kilometers around the grandfathered earth stations in the 3650-3700 MHz band.[50] To ensure the Fixed-Satellite Service (FSS) stations received sufficient protection against harmful interference, the Commission's analysis relied on "worst-case conservatism."[51] The zones were not absolute; they merely formed a baseline for interference protection, and incumbents and new entrants remained free to negotiate alternative agreements. The

[50] *Wireless Operations in the 3650-3700 MHz Band*, Report and Order and Memorandum Opinion and Order, 20 FCC Rcd. 6502, ¶¶ 59-66 (2005).

[51] *Id.* at ¶ 60.

Commission acknowledged that "a more accurate determination of the requisite separation distances" would have been possible "if the particular operating parameters of both the fixed terrestrial transmitter and protected FSS earth stations are taken into account."[52] The Commission nevertheless concluded that "requiring operators to independently make detailed transmission path and link budget calculations could be unduly burdensome."[53] As in the *3650 Order*, the Commission does not need to conduct detailed and burdensome calculations for every single possible interference path and link budget. The Commission can simply establish an easily predicted area that would trigger BRS relocation by taking into account a handful of undisputed variables about the incumbents' and the new entrants' respective systems.

The relocation zone proposal advanced here has three enormous benefits over the flawed point-to-point proposal originally advanced in this proceeding. First, the methodology to create a relocation zone is well established. The Commission long ago decided that the proper methodology to use when calculating potential interference to a BRS receive station hub is to simply calculate the area a BRS receive station can "see" based on the elevation of the BRS receiver and the topology of the land. More than seven years ago, in the order that first authorized two-way broadband services in the BRS-EBS spectrum, the Commission directed all BRS and EBS licensees to use a line-of-sight analysis to determine whether or not they could establish response station hubs without causing other, geographically

[52] *Id.* at ¶ 66.

adjacent licensees harmful interference.[54] The Commission provided a detailed technical explanation of precisely how to conduct a line of sight analysis from a centralized BRS receive station hub that accounted for topology, but not morphology. The Commission should apply the same line-of-sight methodology that the BRS/EBS licensees used for years to evaluate interference when considering when an AWS base station will cause harmful interference to a BRS response station hub.

Second, a relocation zone is easy to implement. AWS new entrants and BRS incumbents alike can quickly calculate the area from which AWS base station could transmit into the centralized BRS hub receive station. In a particularly flat area with an omni-directional receive antenna, the resulting relocation zone would resemble a circle centered around the centralized BRS receive station hub. In more mountainous regions, the relocation zone would take an oblong shape that reflects the terrain obstacles. Attached as Appendix A are relocation zones for the fourteen

(Continued from previous page)
[53] *Id.*

[54] *Amendment of Parts 21 and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions,* Report and Order, 13 FCC Rcd. 19112, App. D at 10 (1998) ("When analyzing interference from response stations to other systems and from other systems to response station hubs, a propagation model shall be used that takes into account the effects of terrain and certain other factors. The model is derived from basic calculations described in NTIS Technical Note 101. It is intended as a tool for analysis of wide area coverage of microwave transmissions, and it is available built into commercial propagation analysis software packages that are widely used by the MDS/ITFS industry for coverage and interference prediction. In the model described, two loss terms are computed - the free space path loss based solely on distance and the excess path loss (XPL) that derives from terrain obstacles and other elements in the environment. Among the inputs required for some implementations of the model are location and time variability factors. Other factors for such items as clutter and foliage losses can be considered by some software versions, but they will not be used in analyzing the systems considered herein.").

Sprint Broadband Direct markets. Sprint Nextel calculated these relocation zones based on actual BRS receiver height and the relevant topology of the affected area. Because the precise size of the relocation zone will vary depending on the height above ground of the new AWS base stations, Sprint Nextel provides the relocation zones for four different AWS base station height categories: 50 feet, 100 feet, 150 feet, 300 feet. Sprint Nextel estimates that the majority of AWS base stations will be located no more than 50 feet above ground level, which means that most AWS new entrants would trigger relocation only if the new entrants' base stations entered the smallest of the four relocation zones shown for each market. Using a simple line-of-sight analysis and a few basic categories of AWS base station height, both the new entrant and the incumbent can predict exactly where the AWS new entrant can operate AWS base station transmitters immediately and where he must first relocate BRS operations before operating AWS base stations.

Third, a relocation zone methodology is narrowly tailored. Relocations zones will vary in size depending on the height of the BRS receive station and the height of the AWS base stations. BRS centralized receive station hubs at an elevation of 1000 feet "see" further than those located at an elevation of 500 feet. Similarly, AWS transmitters located at elevations of less than 50 feet are less visible to BRS operations than AWS transmitters located at 250 feet or more. In other words, the higher the BRS hub or AWS base station is, the larger the relocation zone will need to be. A line-of-sight analysis can take into account the varying heights of both BRS receivers and AWS transmitters to minimize the size of the relocation and maximize the land area and population that AWS new entrants can serve before

they must relocate the BRS incumbents. The relocation zones will also directly correspond to the degree of receiver directivity and the specific topology in every applicable direction for the response station under study. In this way, a line-of-sight relocation zone allows the size of each zone to automatically adjust depending on the height of the BRS receive station, which will accelerate the deployment of new services and allow for rolling, market-by-market transitions while still ensuring BRS licensees remain protected against harmful interference or unwarranted link-by-link transition of their customers.

System-by-system BRS relocation is the most feasible approach to relocating BRS 1-2 operations out of the 2150-2162 MHz band. BRS receive station hubs are vulnerable to interference within their line of sight. BRS receive station hubs rely on shared logistical, marketing and sales activities within their line of sight. And BRS receive station hubs require access to new consumers within their line of sight to maintain the business fundamentals of the service. Because virtually everything about first-generation BRS operations hinges on line of sight coverage from the BRS receive station, the simplest, most equitable, and most cost-effective manner of accelerating AWS deployment while protecting incumbent licensees against interference is to require AWS new entrants that wants to deploy within line of sight of a BRS receive station hub to relocate all BRS system and its line-of-sight customers.

2. A Similar Relocation Zone Approach Will Protect AWS Receivers Against Harmful Interference in Legacy BRS Video Markets.

The Commission can apply the same relocation zone approach to downstream

video operations to establish a predicted area where AWS mobile receivers may experience harmful interference and should have a right to pay to relocate a legacy BRS video transmission system and its associated receive sites.[55] AWS mobile receivers are vulnerable to high-power transmissions from the legacy BRS video transmission hubs. The legacy BRS transmitters are likely to be powerful enough to generate harmful interference to AWS mobile transmitters anywhere within line of sight of the BRS video transmitters; therefore, the Commission should apply the same relocation zone approach to determine when an AWS new entrant is entitled to relocate a one-way BRS video transmission system and its associated receive sites.

Attached as Appendix B are relocation zones for the markets in which Sprint Nextel continues to operate high-power video facilities. Again, Sprint Nextel calculated these relocation zones based on actual video transmitter height and the relevant topology of the affected area. And here too, the precise size of the relocation zone will vary depending on the height above ground of any given AWS mobile unit. While Sprint Nextel recommends selecting a single default height above ground level for ease of analysis, Sprint Nextel calculated relocation zones assuming three different mobile handset heights of 9 meters, 30 meters and 50

[55] The cities in which Sprint Nextel operates legacy one-way video equipment include: Albuquerque, NM; Cincinnati, OH; St. Louis, MO; Columbus, OH; Youngstown, OH; Bend, OR; Boise, ID; Gilroy, CA; Monterey, CA; Las Vegas, NV; Medford, OR; Sacramento, CA; Lincoln, NE; Bakersfield, CA; Stockton, CA; Maysville, MO; Albany, NY; Brenham, TX; and San Antonio, TX. For proposed relocation zones for these areas assuming 9 meter, 30 meter and 50 meters AWS handset deployments, *see* Appendix B.

meters for illustrative purposes.[56] The Commission should adopt relocation zones as an easily administered means of determining when harm to AWS mobile handsets will warrant relocation of the high-site video broadcast operations currently occupying the 2150-2162 MHz band.[57]

D. To Ensure Comparable Facilities, BRS Licensees Should Receive Spectrum and New Equipment Capable of Providing the Same Throughput, Reliability, and Operating Costs across the Same Geographic Area as the Original System.

For the BRS 1-2 incumbents, alternative spectrum is essential to any relocation. The Commission has consistently held that "comparable facilities" must "be equal to or superior to existing facilities."[58] Although parties should remain free to conduct good faith negotiation on alternative settlements, [59] the AWS new entrants must account for the wireless, point-to-multipoint nature of the BRS service offering. Providing comparable facilities to the BRS incumbents will require AWS new entrants to provide comparable facilities that rely on wireless

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[56] The 30 meter (98.4 feet) and 50 meter (164 feet) heights account for potential in-building operations.

[57] Ducting and other anomalies of radio propagation require special consideration when establishing the BRS 1-2 relocation process. If a BRS licensee operates one-way video operations along the coastline, ducting may carry those signals into distantly located AWS mobile handsets. Conversely, if an AWS licensee operates base stations along the coastline ducting may carry those signals into distantly located, centralized BRS receive station hubs. Therefore, if an AWS licensee experiences harmful interference from BRS downstream video operations attributable to ducting or other unexpected radio propagation phenomena, then the AWS new entrant should have a right to relocate the interference-generating BRS video incumbent from the 2150-2162 MHz band. Similarly, if an incumbent BRS system experiences harmful interference due to ducting, then the AWS licensee generating the interfering signal should discontinue operations, relocate the affected BRS system to the new 2.5 GHz channels, or negotiate another alternative arrangement with the victim BRS licensee.

[58] *Emerging Technologies Third Report and Order,* 8 FCC Rcd. ¶ 36.

[59] *Relocation Notice*, 20 FCC Rcd. at ¶ 27.

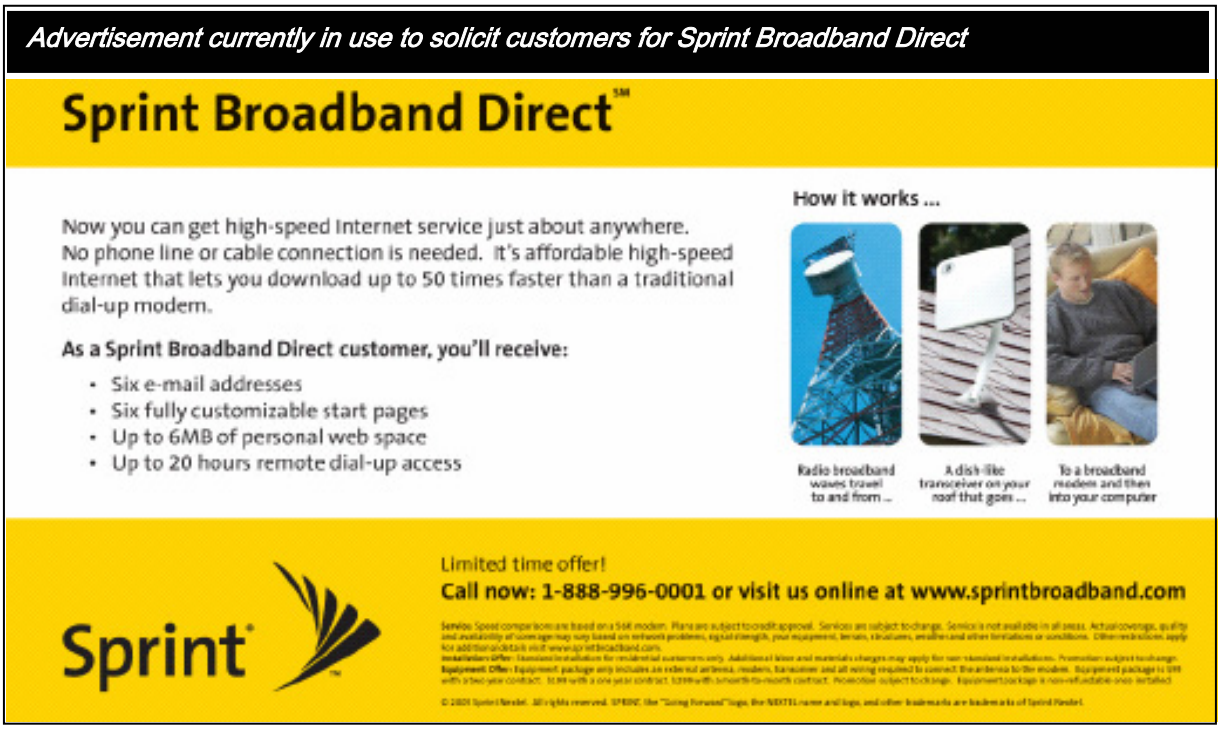
technologies.

1. Unlike Point-to-Point Microwave Data Systems, BRS Licensees Are in the Business of Providing a *Wireless* Service to Their Customers – Not Cable, Fiber, or DSL.

BRS licensees are in the business of providing *wireless* service to their customers and benefit greatly from the shared physical, technical, operational, logistical, marketing and sales of a single type of *wireless* facility. The approach reflects the reality that many BRS wireless broadband customers either do not have access to cable or DSL or have expressly chosen BRS as an alternative to cable or DSL for superior customer service, ease of use, and reliability. Sprint Nextel can rapidly provide broadband service to any customer within line of sight of a BRS receive station hub. Unlike operators of fixed point-to-point links, moreover, BRS licensees are not agnostic about what type of facility delivers service to their end user. On the contrary, Sprint Nextel routinely touts the benefits of its wireless broadband service over wireline-based competitors through comparative advertising in print and other media, such as the one shown below.[60] In this sense, the wireless BRS network that the AWS new entrants are obligated to replace is more than just a collection of discrete links between end-users and a centralized hub. The network is a comprehensive method of covering an enormous swath of territory with a highly reliable broadband product that any consumer within line of sight of the BRS hub station can receive upon subscribing to the service.

[60] For additional recent print advertisements, *see* Appendix C.

Advertisement currently in use to solicit customers for Sprint Broadband Direct



The Commission, however, seeks comment on whether to permit AWS new entrants to replace the uniquely wireless point-to-multipoint service of BRS with other, non-wireless technologies, such as cable, DSL, or fiber optic cable as if the wide-area geographic coverage of a wireless BRS system were just another dumb pipe in a microwave system that runs from one single point to another.[61]

Putting aside the question of whether the revocation of geographic area license rights that the Commission has granted to BRS 1-2 licensees would represent a taking without compensation in violation of the Fifth Amendment, customers have chosen Sprint Nextel's *wireless* broadband service. Some consumers choose Sprint Nextel because Sprint Broadband Direct best meets their

[61] *Relocation Notice*, 20 FCC Rcd. at ¶16.

needs. Others choose Sprint Nextel because competitors failed to offer the same performance, reliability, and customer service as Sprint Nextel. Still others choose Sprint Nextel because no other advanced broadband alternative exists in their area. Whatever the reason, the fact remains that moving a wireless service to different platform changes the customer experience, the economics, and the business of Sprint Nextel. Even if the Commission wanted to dictate corporate investment decisions in wireline versus wireless alternatives, converting an integrated, broadband wireless network into something else is not comparable, cost-effective, or efficient.

BRS is a wireless service today. To deliver the same dense mesh of service availability to consumers, BRS must remain a wireless service tomorrow. The "comparable facilities" requirement cannot mean that the BRS licensee has to turn over wireless broadband customers to competitors offering similar services over cable, fiber or DSL plant. Therefore, while Sprint Nextel supports the concept of providing "comparable facilities" to dislocated incumbents, AWS new entrants must provide comparable facilities that rely on wireless technologies.

2. Before BRS Systems Relocate, BRS Replacement Spectrum Must Be Available.

BRS licensees in the 2150-2162 MHz band must have new spectrum in which to operate before they are shut off. The Commission has long held that adequate replacement spectrum must be available prior to shutting off incumbent operations.[62] When it relocated the point-to-point microwave links to permit the introduction

[62] *Emerging Technologies Second Report and Order,* 7 FCC Rcd. at ¶ 74.

of PCS, for instance, the Commission reallocated five different spectrum bands available for relocation to ensure the dislocated incumbents "will have available alternative frequency bands that are suitable for providing equivalent service with comparable reliability."[63] The Commission also ordered a wide array of service rule changes to accommodate the displaced incumbents to "ensure[] that the spectrum needs of all potentially displaced 2 GHz users will be adequately met."[64] The wireless broadband services currently operational in the 2.1 GHz band deserve no less protection than the Commission afforded to fixed point-to-point microwave links.

In this case, dislocated BRS licensees have nowhere else to go until transition of the 2.5 GHz band is complete. First, the existing 2.5 GHz band plan does not incorporate space for the BRS 1-2 channels. Second, the existing 2.5 GHz band plan interleaves high-site, high-power operations in the areas designated for low-site, low-power use by BRS 1-2 licensees. Third, most of the channel positions in the existing 2.5 GHz band plan will change following transition, which will render any premature BRS 1-2 relocations off frequency with the existing 2.5 GHz band plan. The Commission has made room to incorporate the BRS 1 and 2 channels into the 2.5 GHz band by squeezing most of the existing BRS and EBS channels down to a width of 5.5 megahertz and then re-centering these channels at new locations.[65] Before Sprint Nextel or other BRS operators can use the 2.5 GHz relocation

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[63] *Emerging Technologies Second Report and Order,* 7 FCC Rcd. at ¶ 1.

[64] *Emerging Technologies Second Report and Order,* 7 FCC Rcd. at ¶ 74.

[65] *BRS-EBS Order*, 19 FCC Rcd. at ¶¶ 37-38.

spectrum that the Commission has set aside for displaced BRS 1-2 operations, BRS licensees must complete the process of transitioning to a new 2.5 GHz band plan.

Premature relocation of the BRS 1 and 2 operations to the 2.5 GHz band would position low-site, low-power BRS 1 and BRS 2 operations in an impossible operating environment either co-channel or immediately adjacent to high-power, high-site broadcast-type operations operated by Educational Broadcast Service (EBS) licensees. This arrangement would not only preclude the use of BRS 1, which lies in spectrum designated for low-power, mobile transmissions, but also prevent the schools, ministries, and dioceses that rely on high-power EBS transmissions from receiving EBS programming. Before BRS systems relocate to the 2.5 GHz band, therefore, the BRS transition in the 2.5 GHz band must be complete.

3. Providing BRS Licensees with Comparable Facilities Will Require New Equipment Capable of Operating in the 2496-2502 and 2618-2624 MHz Replacement Bands.

AWS new entrants will need to reimburse BRS licensees for equipment capable of operating in the 2496-2502 and 2618-2624 MHz bands instead of the 2150-2162 MHz band. Existing BRS transceivers cannot output a signal in the 2500 MHz band. A transceiver is a device that includes both a transmitter and receiver within a single unit. Transceiver components include a temperature-controlled crystal oscillator (TCXO), mixers, frequency dividers, and other radio frequency components necessary to produce the band-specific up- and down-conversions. These components are fixed to up-convert only in the 2150-2162 MHz band and must be replaced to operate in the 2.5 GHz band. Similarly, the associated existing subscriber antennas, modems, and other components were

designed and optimized for uplink in the 2150 – 2162 MHz band. Finally, BRS transceivers must also comply with a different OOBE mask. As a result, no BRS equipment currently deployed in the 2.1 GHz band can be salvaged for use in the replacement bands. AWS new entrants must bear the deconstruction and replacement costs for providing comparable facilities capable of serving the same geographic area in the 2.5 GHz band as was served in the 2.1 GHz band in terms of throughput, reliability, and operating costs.

AWS new entrants must pay to deconstruct the hard-wired, fixed BRS transmitters that currently occupy the band to prevent harmful interference to AWS mobile receive handsets. In its *Relocation Notice*, the Commission sought comment on whether AWS new entrants were required to replace BRS CPE.[66] In fixed service relocation, a new entrant would never be permitted to pay to relocate only the receiver of a fixed point-to-point link and exclude the transmitter. By the same token, a new entrant cannot be permitted to only relocate the receive-station hub in the BRS system. Wireless broadband operators also properly regard CPE as an integral component of the overall wireless broadband solution that they offer to the public. CPE that transmits in the 2150-2162 MHz band is an essential part of the integrated BRS communications system that must be transitioned to the 2.5 GHz band.

Separately, Sprint Nextel has explained at great length why terrestrial mobile and fixed operations, such as BRS, cannot share channels with the

[66] *Relocation Notice,* 20 FCC Rcd. at ¶ 18.

incumbent operations in the 2495-2500 MHz band that include the Mobile-Satellite Service (MSS), Industrial, Scientific and Medical (ISM) devices, and the Broadcast Auxiliary Service (BAS).[67] Numerous Commission decisions and ample record evidence in docket 02-364 demonstrate that sharing between these dissimilar services is difficult, if not impossible. The Commission has asked that the specifics of these interference problems not be addressed here.[68] Unless reversed on reconsideration, however, the unprecedented four-way, co-primary sharing arrangement makes BRS 1 unlike every other channel in the 2.5 GHz band and will, at a minimum, require BRS licensees to custom design equipment capable of overcoming predicted interference from co-primary MSS, ISM, and BAS. If operations are feasible, designing, manufacturing, and purchasing equipment custom made for BRS 1 will cost substantially more than purchasing equipment capable of operating in every other channel of the BRS band. To provide BRS licensees with comparable facilities, AWS new entrants should bear responsibility for any incremental costs associated with custom-designing equipment necessary to operate on a co-primary basis with MSS, ISM, and BRS. The precise equipment specifications will need to await resolution of the petitions for reconsideration filed against the *MSS-ISM-BAS-BRS Sharing Order* adopted last year.[69]

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[67] *See, e.g.,* Petition for Reconsideration of Nextel Communications, Inc., IB Docket 02-364, ET Docket 00-258, *available at* <http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516483280>.

[68] *Relocation Notice*, 20 FCC Rcd. at ¶ 13 n.42.

[69] *Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands, Amendment of Part 2 of the* (continued….)

4. Facilities Owners Must Receive Just Compensation for Property that the Government Takes from Them.

Lessees must receive compensation for the property that the Commission's relocation decision will render useless. The Commission seeks comment on how to provide comparable facilities to BRS operators that lease the underlying spectrum they use to provide broadband service to the public.[70] The Commission proposes to make the spectrum licensee, not the facilities owner, the party able to negotiate for "comparable facilities." While the facilities owner might be encouraged to attend negotiations over whether and how to relocate the operators' existing BRS operations, the Commission's proposal would allow the BRS licensee and the new entrant to reach a private settlement without any requirement that the actual facilities owner receive compensation for his loss. Under the Commission's proposal, the actual facilities owner has no assurance he will receive any compensation whatsoever for the property rendered useless by the new AWS deployments in the band, much less the just compensation to which he is entitled.[71] This result is fundamentally unfair and contrary to the Fifth Amendment of the Constitution.[72]

When the government takes private property, "just compensation must be

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Commission's Rules, Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 13356 (2004) (*MSS-ISM-BAS-BRS Sharing Order*), *available at* <http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-135A1.doc>.

[70] *Relocation Notice,* 20 FCC Rcd. at ¶ 20.

[71] *Id.*

[72] U. S. Const., Amend. 5 ("nor shall private property be taken for public use, without just compensation").

paid *to the owner*."[73] A licensee who leases raw spectrum to a facilities operator does not own the facilities being taken. On the contrary, the spectrum licensee who holds a spectrum license before the relocation will continue to do so after the relocation.[74] The facilities owner, by comparison, will have nothing to replace his lost facilities unless the licensee, contrary to all rational expectation, volunteers to pay all or some of the relocation payments to the lessee.

When the government takes facilities, it must pay the *facilities owners* for them – not their landlords, the spectrum license holders, or any other party. The Commission has issued a decision that renders existing facilities in the 2.1 GHz band useless and has proposed to offer "comparable facilities" as a replacement. The spectrum licensee will be made whole through receipt of a new license; however, the facility owners, who have constructed, built, and operated the system, stand to receive nothing at all. To ensure that the *facility owners* receive just compensation, the Commission must grant comparable facilities rights to the owner of the facilities being taken. Whether or not the licensee of the underlying spectrum on which these facilities operate retains *de jure* control of the spectrum license is

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[73] *Brown v. Legal Foundation of Wash.*, 538 U. S. 216, 231-232 (2003) (emphasis added).

[74] The Commission proposes to immediately reassign 2.1 GHz BRS licensees with unconstructed or unused facilities to corresponding frequency assignments in the 2.5 GHz band. *Relocation Notice,* 20 FCC Rcd. at ¶ 19. The Commission, in other words, proposes that licensees without facilities are entitled to nothing but a new license. Why, then, should licensees that happen to have leased their spectrum rights to third parties be treated any differently? Why are licensees that happen to have entered leases with facilities owners entitled to the very compensation that the Commission denies all other spectrum licensees? There are no legally sustainable answers to these questions. The facilities owner, not the spectrum licensee, has spent millions of dollars constructing and operating facilities; therefore, the facilities owner must be entitled to just compensation for the property he will lose.

irrelevant to ensuring that the owner of the facilities being taken receives just compensation. Facilities owners must receive comparable facilities for their loss.[75]

5. To Encourage Broadband Deployment and Promote Secondary Markets, the Commission Should Not Terminate AWS Licensees' Relocation Obligations Prematurely or Limit the Ability of BRS Licensees to Conduct Transactions.

Allowing the AWS relocation obligation to expire prior to any substantial service build-out deadline provides an incentive for the AWS new entrants to delay providing wireless broadband services to the public. The Commission seeks comment on whether to sunset the AWS new entrants' relocation obligation to BRS licensees ten years from the effective date of this Order.[76] This ten-year expiration date of the BRS relocation obligation is premature.

New AWS licenses have no obligation to construct anything in their spectrum until the end of their initial, fifteen-year license term. If the Commission adopts its proposal to allow the BRS relocation obligation to expire in ten years, the AWS new entrants would still have five years within which to construct and operate their AWS systems. Allowing the BRS relocation obligation to expire five years before the AWS licensees must construct facilities in the band creates a perverse incentive for the AWS licensees to delay broadband deployment in order to avoid having to

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[75] To the extent identifying the owners of facilities operating under any given spectrum license presents a problem, the Commission can simply order any BRS 1-2 licensee that does not own or operate his own facilities to inform any AWS new entrants of the facilities operator's actual identity. This simple process will allow the AWS new entrants to negotiate directly and exclusively with the facility owners and operators whose property is actually being taken.

[76] *Relocation Notice*, 20 FCC Rcd. at ¶ 31.

pay to relocate the incumbent BRS licensees. To prevent AWS licensees from delaying the rollout of broadband service to the public for perceived regulatory gain, the BRS relocation obligation and the initial license term should expire on the same date.

The AWS relocation obligation should also continue regardless of any transfer or assignment of BRS licenses in the 2150-2162 MHz band. The Commission proposes to exclude any BRS licensees that assign or transfer their licensees from the relocation process if the sale or transfer somehow renders relocation more expensive to relocate.[77] Assignments and transfers of spectrum licenses have no bearing whatsoever on whether or not relocation will be any more, or less, costly. Any assignee or transferee simply assumes the rights and obligations under the terms of the original BRS relocation decision. The new licensee will bear the same obligation to mitigate costs as the original licensee, and all licensees will have a duty to negotiate in good faith for a timely, cost-effective transition.[78] Despite having no real public interest benefits, the proposal to restrict alienation undermines the strong public interest in moving spectrum to its highest valued use.[79] Particularly in the 2.5 GHz band where overlapping, irregularly

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[77] *Relocation Notice,* 20 FCC Rcd. at ¶ 20.

[78] *See* 47 C.F.R. § 101.89(d)(1)-(3) (defining throughput, reliability and operating costs).

[79] *Promoting Efficient Use of the Spectrum Through Elimination of Barriers to the Development of Secondary Markets, Second Report and Order*, Order on Reconsideration, and Second Further Notice of Proposed Rulemaking, WT Docket No. 00-230, 19 FCC Rcd. 17503, Separate Statement of Commissioner Kevin J. Martin (noting that easing restrictions on license transfers reduces transaction costs and "create[s] new opportunities for licensees with under-utilized spectrum, to the benefit of consumers.").

shaped licenses result in a "Swiss cheese" licensing scheme, assignments and transfers are essential for wireless licensees to assemble the necessary spectrum footprint to offer service. By calling into question the ability of transferred licenses to receive relocation payments, however, the proposed rule will cast a cloud of uncertainty over important transactions in the 2.5 GHz band. Therefore, assignments and transfers of BRS licenses should never exempt AWS licensees from their relocation obligations.

III. CONCLUSION

AWS licensees must relocate BRS before any AWS operations with line of sight to centralized BRS receive stations can commence. Rather than require an intrusive, piecemeal relocation process, AWS new entrants should move existing systems as a unit once new BRS spectrum becomes available. Adopting relocation zones will prove easier, less time consuming, and more cost effective for both incumbents and new entrants than an unwieldy, link-by-link relocation process. Most importantly, adopting the relocation zone approach will ensure that 33 million American consumers in rural, suburban, and urban areas continue to be able to receive BRS wireless broadband services without disruption.

Respectfully submitted,

SPRINT NEXTEL CORPORATION

/s/ Robert S. Foosaner

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